omissions which characterize the text. Against many of the arguments made by the author, other writers had previously raised very serious objections. We look in vain for any answer to many of these objections, or even mention of them. In the chapter on Dalmatian fiords, there is no intimation of the fact that a normally dissected belt of folded mountains, partially submerged (which is the type of topography found in this region) will necessarily have the long, narrow bays, the steep sided, spurless valley walls, and the short cross-valleys which the author erroneously correlates with those features in fiord districts often described in the same terms, but which really present a distinctly different topographic aspect. The fact noted by the author (202) that one of these drowned valleys has been called a "fiord" in Baedeker's guide book, can not be regarded as very significant. In support of the tectonic theory the author states that the Dalmatian valleys are not arranged like the members of ordinary river systems, as in Dalmatia the branchings and bendings are usually rectangular (207). He does not recognize that in all folded mountain regions involving rock layers of different resistance, the ordinary river valleys normally have this rectangular or "trellised" pattern. His arguments for the tectonic origin of the submerged Dalmatian valleys would apply with precisely as much force to the valleys of the folded Appalachians, the Juras and other similar dissected folds. The short cross valleys are not recognized as a normal product of river erosion across a narrow ridge of hard rock, but are interpreted in accordance with that ancient theory, long ago abandoned by most geologists, which explained the cross valleys as short cracks formed by bending brittle material. The substantial reasons which led geologists to abandon this theory as untenable are not referred to by the author.

It would be easy to multiply indefinitely examples of the unsound reasoning which seems to the reviewer to deprive the book before us of most of its value. The instances I have cited are not isolated examples which might be explained as the result of careless writing, but are typical of the book, as a whole, and must fairly represent the author's mental attitude toward the problem of fiord formation. It seems to the reviewer, therefore, that Gregory's attempt to rehabilitate a discarded theory of fiord formation must be considered a failure.

DOUGLAS W. JOHNSON

SPECIAL ARTICLES

THE IMPORTANCE OF A CONSIDERATION OF THE FIBER PROTEINS IN THE PROCESS OF BLEACHING COTTON

THE nitrogen which is found in the ripe cotton fiber seems to have some bearing upon the yellowing of bleached cotton cloth, as was pointed out by J. C. Hebden in his paper read in Troy before the American Institute of Chemical Engineers.[1] He showed that in the process of bleaching cotton cloth after the first caustic boil 91.5 per cent. of the proteins were removed from the fiber, whereas of the fats and waxes only 20.4 per cent. were removed; and after the second caustic boil 91.7 per cent. of the proteins and only 64 per cent. of the fats and waxes were eliminated; the "chemick" and the "sour" together, he showed, removed 12.05 per cent. of the remaining protein impurities and 10.23 per cent. of the remaining fats and waxes. According to his analysis, after all the bleaching operations there were still left on the fiber 30.4 per cent. of the total fatty and waxy impurities, whereas of the total proteins there were left only 7.3 per cent., and as the cloth which he analyzed had undergone a "good bleach," he felt safe in inferring that it is the failure to remove the protein impurities from the cotton that results in a "bad bleach" or causes the yellowing of cloth in steaming or during storage.

So far as we know, the investigator above referred to was the first to point out the possibility that the proteins of the fiber played such a part in the bleaching of the cloth. Previous to this it has been believed that the fatty and waxy matters and especially the

[1] *Journal of Industrial and Engineering Chemistry*, September, 1914, Volume 6, No. 9, page 714.

pectins were chiefly responsible for the yellowing of the fiber, since they formed water insoluble compounds, which remained on the fiber. The analysis of Hebden, however, showed that the calcium fixed on the fiber in the form of calcium salts was decomposed by the following acid treatments, and he explained the presence of the calcium on the fiber after the sour by the formation of a calcium cellulose similar to that of soda cellulose. The possibility of the formation of such a cellulose, he believed, was supported by the fact that cotton cloth which has been boiled and bleached did not produce as clear and as brilliant a turkey-red as cloth which had been simply boiled, because the former was not in a condition to fix calcium.

As the result of investigation in this line on cloth from different bleacheries, it occurred to us that an analysis of the growing cotton fiber with a view of determining the nitrogen and the fat and wax factors might reveal some points of importance. The determinations were carried out on Durango cotton raised on the United States Experiment Farm, San Antonio, Texas.[2]

The nitrogen factors were determined by the Kjeldhal-Gunning method, and the fat and wax factors by extracting samples of the fibers first by ether and then by alcohol. Some of the experiments were carried out in duplicates and some in triplicates, and the averages of the determinations were recorded as the final results. The figures given in the table below can only be regarded as approximating the absolute values of the nitrogenous and fatty and waxy constituents of the fiber; for the determination of exact values a much larger number of experiments should be performed. Nevertheless, they show the tendencies of the two factors and have, therefore, significance. The nitrogen determinations were made and recorded beginnings from the 14–16-day stage up to the 36–38-day stage, whereas the ether and the alcohol extracts were recorded only beginning with the 22–24-day stage, because in the stages previous to this the amount of tannins extracted by both ether and alcohol were much higher than the fats and waxes.

[2] We wish to thank Mr. Rowland D. Mead, of the United States Department of Agriculture, for supplying us with the necessary samples of the cotton fibers.

Age in Days from Flowering	Nitrogen in Per Cent.	Protein N. × 6.25	Alcohol Extr. in Per Cent.	Ether Extr. in Per Cent.	Fat and Wax in Per Cent.
14–16	2.2300	13.938	....	....	....
16–18	1.9480	12.175	....	....	....
18–20	1.4250	8.907	....	....	....
20–22	1.1820	7.388	....	....	....
22–24	....	....	4.405	2.819	7.225
24–26	.3760	2.350	1.745	.775	2.418
26–28	.3195	1.997	1.398	.713	2.111
28–30	.3123	1.952	1.415	.800	2.215
30–32	.2657	1.661	1.522	.782	2.304
32–34	.2590	1.619	1.536	.709	2.245
34–36	.2503	1.564	1.403	.802	2.205
36–38	.1815	1.134	1.409	791	2.200

From the above table it may be seen that the fats and waxes showed neither a gradual increase nor a gradual decrease in their percentages, and in view of the fact that the fiber was growing, it seems reasonable to suppose that the fatty and waxy substances increased proportionally as did the fiber. We believe that were the numbers of the experiments large enough to give averages approximating the absolute values of the fatty and waxy factors, this point would have been brought out much clearer. But even from the determinations which we can report, it appears that the fats and waxes extended in an even and constant thickness over the fiber. If we accept the view that the function of these substances is to protect the fiber from external influences of weather and disease, that is that they are merely external coats of the fiber, the significance of such a proportional growth of these constituents becomes clear. If, however, the fats and waxes are phosphotides taking part in the growth, there would also be a proportional increase. The nitrogen figures, on the other hand, show gradual decrease in percentage with the increase of the age of the fiber. The sudden increase of the factor at the 20–22-day stage as compared with that of the 24–26-day stage may be due either to a rapid growth of the nitrogenous constituents of the fiber or to the adhering nitrogenous coloring matters of the parts of the boll which surrounded the

fibers. If we limit ourselves to a consideration of the nitrogen figures of the samples representing only the higher stages of development of the cotton fiber even then we are permitted to assume that the nitrogen was deposited early in the lumen of the fiber and its absolute value remained constant. This assumption becomes more plausible when the nitrogen figures are multiplied by 6.25 to express the percentage of proteins present in the fiber. Most of this early and constant protein deposit remains in the lumen in the form of insoluble albuminoids and in the form of alcohol soluble proteins; some of it is utilized by the growing fiber, probably by the spiral forming the walls of the lumen. That the proteins of the fiber are of an insoluble nature is shown by the fact that the percentage of nitrogen of gray cloth as obtained by Hebden (0.191 per cent.) remained practically unchanged after the "steep" (0.192 per cent.), and that some of it exists in the fiber in the form of alcohol soluble proteins, is shown by the number which he obtained for nitrogen after extracting the cloth by ether and alcohol. The percentage, as shown in his table, was reduced from 0.191 per cent. to 0.161 per cent. The fact that the first caustic boil removed 91.5 per cent. of the protein content clearly points to the decomposing action of boiling alkali upon the albuminoids.

The 7.3 per cent. of total protein content remaining in the fiber after all the operations of the bleaching process can be considered as that part of the fiber proteins which has become an inseparable part of the wall of the lumen. The lowest percentage for fats and waxes (2.200 per cent.) obtained by us for the fiber taken directly from the field was considerable higher than that obtained by Hebden for fibers which were ginned, carded, spun and woven (1.405 per cent.). The removal of a large part of the fats and waxes by mechanical means during ginning, carding, spinning and weaving proves that these constituents form the outside cover of the fiber, and it is reasonable to suppose, therefore, that they do not play as important a part in bleaching as is ascribed to them. The percentage of nitrogen in our experiment (0.1815 per cent.) was somewhat smaller than that obtained by Hebden for cotton in the form of cloth (0.191 per cent.) and points to the fact that, unlike the fats and waxes, the proteins of the fiber are not adventitious nor coating factors, but that they are within the lumen or are in part intimately bound to the fiber. As the proteins are of the insoluble kind, the above seems to justify the assumption of Hebden that in bleaching the removal of the proteins may be of more importance than that of the fats and waxes.

These results and the results of Hebden show the necessity of a careful investigation of the chemical nature of the fatty and waxy substance as well as of a further study of the effect of growth on these constituents of the cotton fiber.

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THE AMERICAN PHYTOPATHOLOGICAL SOCIETY

The sixth annual meeting of the American Phytopathological Society was held in the medical building of the University of Pennsylvania, Philadelphia, Pennsylvania, December 29, 1914, to January 1, 1915. About 95 members were present; 7 new members were elected, making a total of 293. The following officers were elected for 1915:

President—H. H. Whetzel.

Vice-president—W. A. Orton.

Councilor—Mel. T. Cook.

Donald Reddick was elected editor for three years and made chairman of the board. The following associate editors were elected for three years: H. W. Barre, E. A. Bessey, H. R. Fulton, W. T. Horne.

C. L. Shear was elected business manager vice Donald Reddick.

The society decided to hold its next annual meeting at Columbus, Ohio, in connection with the American Association for the Advancement of Science.

A special meeting is to be held at San Francisco, August 2 to 7.

The committee on common names of plant diseases submitted a report which was ordered distributed to the members of the society for suggestion and criticism.